

## CR7 Stream Reach Summary

**Study Reach:** CR7, Colorado River- Blue River confluence downstream to the Grand-Eagle County Line.

**Reach Description:** Approximate channel length: 16.5 miles with an average channel slope of 0.6%, subdivided as follows:

- Blue River to top of Gore Canyon: Approximate channel length: 3.75 miles, approximate channel slope 0.2%.
- Top of Gore Canyon to Pump House: Approximate channel length: 5.5 miles, approximate channel slope 1.2%.
- Pump House to County Line: Approximate channel length: 7 miles, approximate channel slope 0.3%.

This long reach of the Colorado River corridor has three distinct subreaches. The upper portion of the study reach extends from the Blue River to the top of Gore Canyon. This section is flat, wide and sinuous with overbank land use dominated by agriculture. From the top of Gore Canyon to Pump House (a popular BLM river access site), the river becomes very confined and steep, surrounded by rocky canyon walls. The final stretch of CR7, from Pump House to the County Line, has a milder slope compared to the middle subreach, and steep, sparsely vegetated overbanks.

Forested vegetation present in the middle and lower subreaches includes spruce, Douglas fir, aspen, and ponderosa pine. Typically, open slopes are sparsely covered with sage brush and pinyon-juniper. Immediately adjacent to the river is a narrow corridor of willows, sedges, and cottonwood trees. Much of the land along the middle and lower reach is public, managed, primarily by the BLM, with some ownership by the Forest Service, and state lands. Private property is interspersed along the river corridor and is primarily used for agriculture. The Denver and Rio Grande Western Railroad parallels the river, as do county and state roads. The section of river from Pump House to Rancho Del Rio, 3 ½ miles past the County Line, is heavily used for recreation by commercial and private rafters, kayakers and anglers. The BLM property in this reach has been identified as eligible for wild and scenic river designation, has a scenic rating of A and a preliminary classification of Recreational. ORVs primarily include boating and fishing, as well as geological, cultural and paleontological resources.



*Immediately Upstream of Pump House from Gore Trail*



*Pump House Put-in Number 1*



*From Radium Bridge looking upstream*

**Flow Recommendations:**

The Upper Colorado River Wild and Scenic Stakeholder Group (SG) has worked together to develop a Plan to protect ORVs in this reach. SG is proposing this Plan to BLM and the Forest Service as a potential management alternative for resource management. Contained within this Plan is a recommendation for base flows to protect recreational fishing and flow guides to protect the recreational floatboating ORV. Base flows are provisional for a 3 to 5 year period and floatboating guides are provisional a maximum of 3 years, after which adjustments may occur. Flow recommendations for the SG Plan are noted below.

**Environmental Flow Methodology:** A PHABSIM analysis was performed based upon 7 surveyed cross-sections from Pumphouse downstream to OK Corral in Eagle County. See Appendix A for methodology. No CWCB instream flows have been set for this reach.

**Water Users:**

- Irrigators, municipalities and industry flow-related issues: none reported.
- Recreation: This reach has some of the most spectacular, high-quality floatboating in the State of Colorado. Commercial rafting companies in Grand and surrounding counties will take thousands of trips each year, primarily below Pumphouse. Above Pumphouse, Gore Canyon is not typically rafted commercially due to steep gradients, obstacles and general high danger, but it is often rafted and kayaked privately. CR7 is also an outstanding trout fishery and is known as one of the state's premier waters.

**Summary of Flows:**Environmental, recommended flow ranges (See Appendix A for methodology).

- 600 to 1000 cfs, April through September
- 400 to 600 cfs, October through March
- Flushing flow, at least 2500 cfs for 3-day duration with a frequency of 1 in 2 years during the mid-May to mid-June period.

SG Plan (W&S)

- 800 to 1000 cfs, April-June
- 600 to 1000 cfs, July-September
- 400 to 800 cfs, October-November
- 400 to 600 cfs, December-March
- Flushing flow to be completed

CWCB flows

- In February 2008, Eagle County submitted flows to CWCB for establishing ISF downstream of State Bridge to Dotsero. The flows are generally consistent with the recommendations included herein.

Water Users

- Irrigators, municipalities and industry: The local diversions in this reach could potentially divert up to approximately 36 cfs. Most of the diversions are made in the summer for irrigation and will likely have some return flows. The Town of Kremmling has a 5 cfs diversion in CR7 that would most likely be made year-round.
- Recreational flows: Results from private and commercial users are presented below:
  - Angling: minimum 450 cfs, optimum 1000 cfs
  - Kayaking:
    - Gore Canyon: 900-1400 cfs
    - Pumphouse: 500-1000 cfs

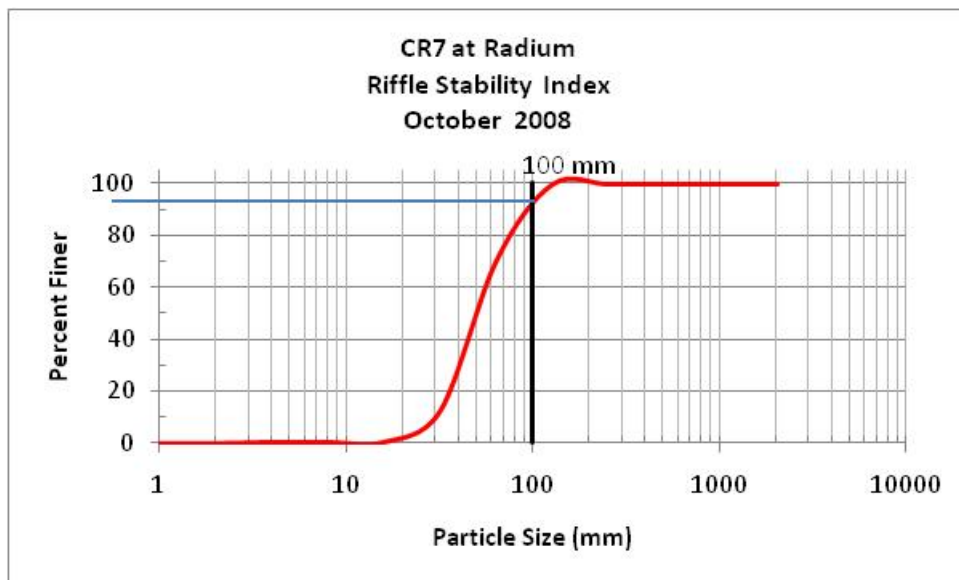
- Rafting:
  - Gore Canyon: 1000-1800 cfs
  - Pumphouse: 700-1300 cfs
- Recreational flows: The SG Plan includes the following chart representing the proposed numeric criteria which include the number of usable days for three different floatboating experiences over four different flow scenarios (wet to dry years).

**Number of Usable Days: minimum (median) maximum**

	Total Usable Days	Green Opportunities 700-1300 cfs	Blue Opportunities 1300-4000 cfs	Black Opportunities 4000-7400 cfs
Wettest 25% years	115(161)180	38(74)121	32(72)79	4(22)28
Wet Typical 25% years	120(153)169	68(108)119	19(57)79	0(0)5
Dry Typical 25% years	74(115)141	69(106)127	0(14)33	0(0)0
Driest 25% years	62(80)96	53(73)87	0(1)25	0(0)0

**Stream Assessments:** In August and October 2008 Tetra Tech conducted three stream assessments in CR7. These included Stream Reach Inventory /Channel Stability Evaluation (SRI/CSE), EPA Habitat Quality Assessment (HQA) and a Riffle Stability Index (RSI) evaluation. The RSI was performed at Radium immediately downstream of the boat launch site. The SRI/CSE evaluation scored in the high end of the 'fair' category, the EPA HQA evaluation scored in the high end of the 'suboptimal' category, and the RSI of 92 indicates riffle substrate is highly unstable with up to 92% of particles mobilized by recent high flow events. Relevant issues that were revealed in the stream assessments include that some fine sediment deposition occurs in this reach, especially in moderate to low water velocity habitats both upstream and downstream of Gore Canyon. Some minor bank instability and lack of riparian vegetation was also noted along the railroad embankment, but in general, the habitat quality is high as noted in the EPA HQA. Results of the assessments are summarized in the following table and plot. Details and methodology are presented in Appendix A.

Reach CR7 Stream Assessments			
Stream Reach Inventory/Channel Stability Evaluation		EPA Habitat Quality Assessment	
Attribute		Attribute	Score
<b>Upper Banks</b>		<b>Channel</b>	
1	Landform Slope	4	1 Aquatic Habitat Barriers/ Diversion
2	Mass wasting hazard	10	2 Aquatic Structure as Cover
3	Debris Jam Potential	2	3 Velocity/ Depth Regimes
4	Vegetation Cover	7	4 Channel Flow Status
<b>Upper Bank Score: 23</b>		5	Channel Alteration
<b>Lower Banks</b>		6	Frequency of Riffles
5	Channel Capacity	2	7 Channel Sinuosity
6	Bank Rock Content	4	<b>Channel Score 111</b>
7	Flow obstructors & Deflectors	2	<b>Banks</b>
8	Cutting	8	8 Bank Stability
9	Deposition	8	9 Riparian Vegetation Cover and Disturbance
<b>Lower Bank Score: 24</b>		10	Riparian Vegetation zone width
<b>Channel Bottom</b>		<b>Bank Score 44</b>	
10	Rock Angularity	2	<b>Total Score 155</b>
11	Brightness	2	<b>Notes</b>
12	Consolidation/Particle Packing	4	
13	Bottom size distribution	8	
14	Bed Scour and Deposition	12	
15	Clinging Aquatic Veg	3	
<b>Channel Bottom Score: 31</b>			
<b>Total Score: 78</b>			



**Spawning Observations:** A trout spawning survey was conducted in CR7 below Gore Canyon on 31 October 2008. No spawning activity or redds were observed, perhaps due in part to the limited habitat that could be visually inventoried because of high water velocities and depths. It is also possible that spawning in this most downstream reach had not yet begun due to higher water temperatures persisting. This reach should be more thoroughly resurveyed for trout spawning activity.

**Hydrologic Records:** USGS Gage Station 09058000 (County Rd 9 at Kremmling, CO) has been in operation since 1962. Median monthly flows are highest in June, about 1500 cfs, and lowest in January and February (about 500 cfs), with monthly medians for the late summer in the range of 800 to 1000 cfs. Median daily flows peak at 1780 cfs on May 30 and reach the annual low of 500 cfs by January 31. Median daily flows for the important summer growth period for trout range from 1240 cfs on July 1 to 791 cfs on September 29. The available hydrologic record indicates the recommended environmental target flow ranges have been commonly available within reach CR7. The recommended minimum flushing flow is exceeded by the median 3-day maximum flow of 2660 cfs for the 1985 to 2007 period-of-record.

**Water Temperature:** CR7 is a Tier II stream reach as designated by CDPHE with a chronic temperature standard of 18.2°C MWAT and an acute temperature standard of 23.8°C DM. Temperature data reviewed in reach CR7 indicate stream temperatures for the Colorado River in this area are generally below the MWAT and DM standards. The MWAT near Kremmling was exceeded for several days in August of 2007 while the DM remained within standards.

**Water Quality:** No water quality concerns were noted from the available data.

**Water Supply Issues (UPCO):** The UPCO report indicates that under current conditions, water supply is adequate and under future conditions, occasional shortages can be expected. No CWCB ISF currently exists in this reach.

#### **Summary of Results and Additional Remarks:**

1. Recommended environmental target flow ranges are commonly present within the reach.
2. The assessments for this reach indicate some fine sediment deposition occurs in moderate to low velocity habitats and riparian vegetation is marginal at some locations.
3. Temperature exceedences are infrequent and there is no water quality concerns noted in the available data.
4. Minimum flows for recreation are commonly present.
5. A Wild and Scenic stakeholders group, comprised of representatives from both the east and west slope of Colorado are developing an alternative to the Wild and Scenic designation for submittal to BLM. As of June 2010 final recommendations from the Wild and Scenic have not been finalized.
6. Additional habitat assessments may be forthcoming through cooperative agreements with the Wild and Scenic Stakeholders group and the State of Colorado. The recommendations made in this SMP should be reviewed and compared to the additional assessments with potential adjustment.
7. Recommendations for recreational flows should be reviewed with final recommendations in the Wild and Scenic alternative and compared and adjusted.
8. The work performed within this reach was a cooperative effort between Grand and Eagle counties.

**Restoration Opportunities:** The most important issue for this reach is to focus on and attempt to meet flow recommendations developed herein, including flushing flows, and to support the recommendations forthcoming from the Wild and Scenic Alternative. Additional trout spawning surveys are also recommended.

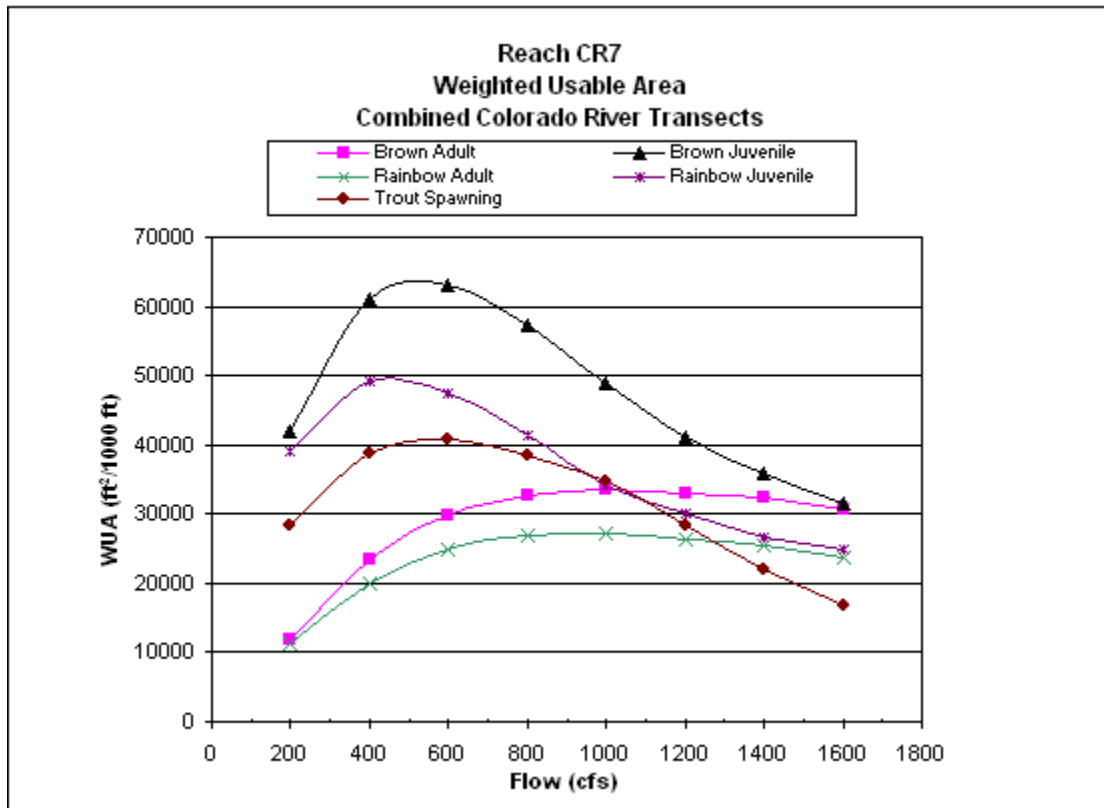
**Monitoring:** Establish and implement a monitoring program. Parameters should include surface water temperatures and streamflows between Pumphouse and the County Line; water quality monitoring; air temperature; intergravel fine sediments; fish population and diversity; and benthic macro invertebrates. Continue to monitor surface water temperatures and flows at the Kremmling gage. Monitor recreational use and update monitoring procedures as required by Wild and Scenic Alternative.

**Support Data**

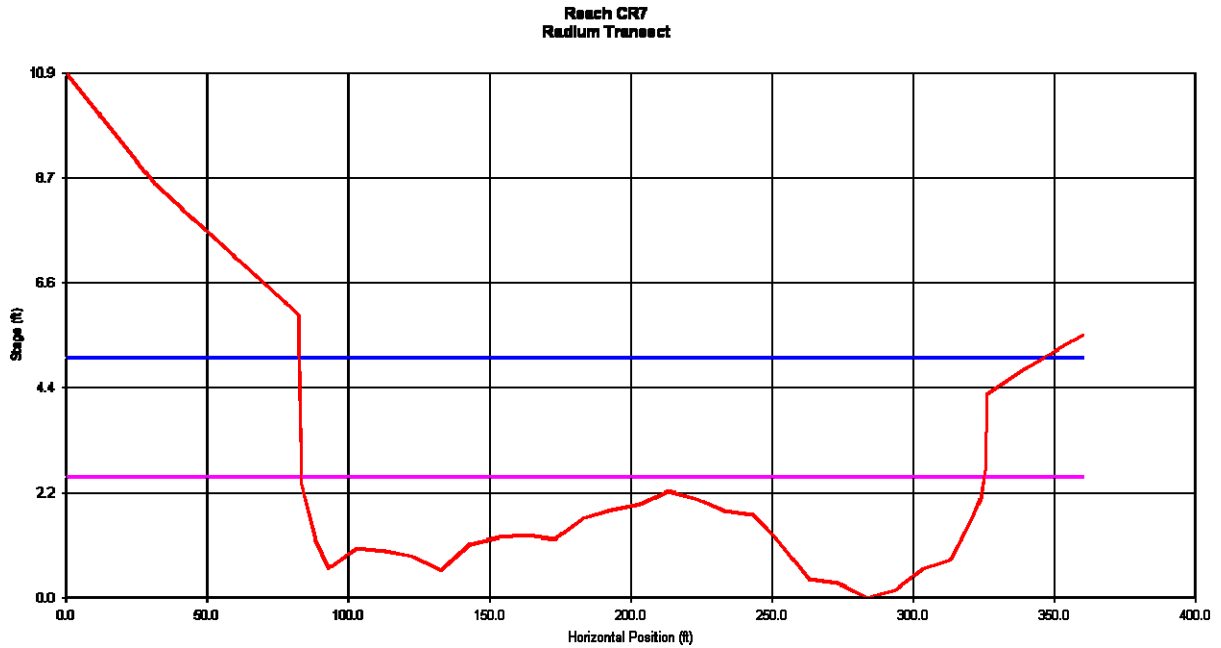
**Weighted Useable Area Plots and Tables**

Habitat-flow relations for the target species and life stages at Reach C7 at seven Colorado River surveyed cross sections.

Reach CR7					
Q	Brown Adult	Brown Juvenile	Rainbow Adult	Rainbow Juvenile	Trout Spawning
(cfs)	Weighted Usable Area (ft <sup>2</sup> /1000 ft Stream Length)				
200	11756	42073	11165	39110	28477
400	23400	61073	19943	49164	38796
600	29881	63104	24774	47433	40698
800	32822	57307	26871	41447	38610
1000	33602	49025	27046	34102	34791
1200	33077	41198	26254	30079	28300
1400	32299	35985	25437	26674	22069
1600	30694	31605	23833	24863	16720

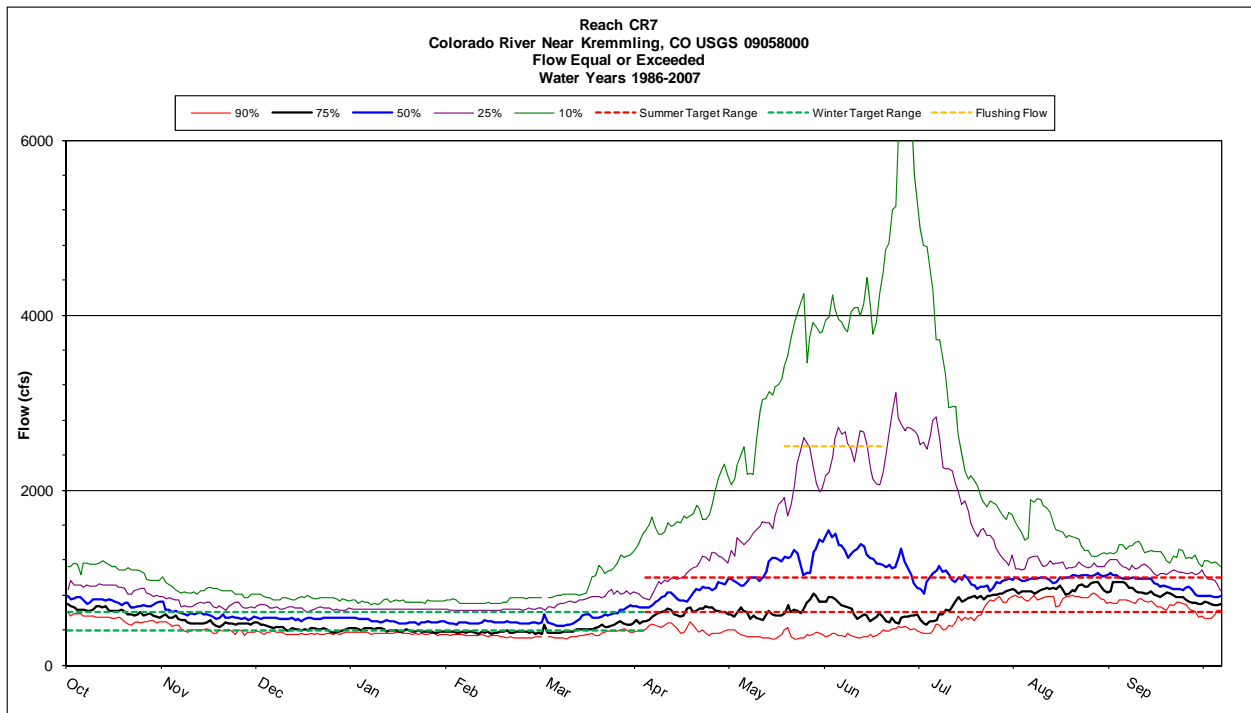
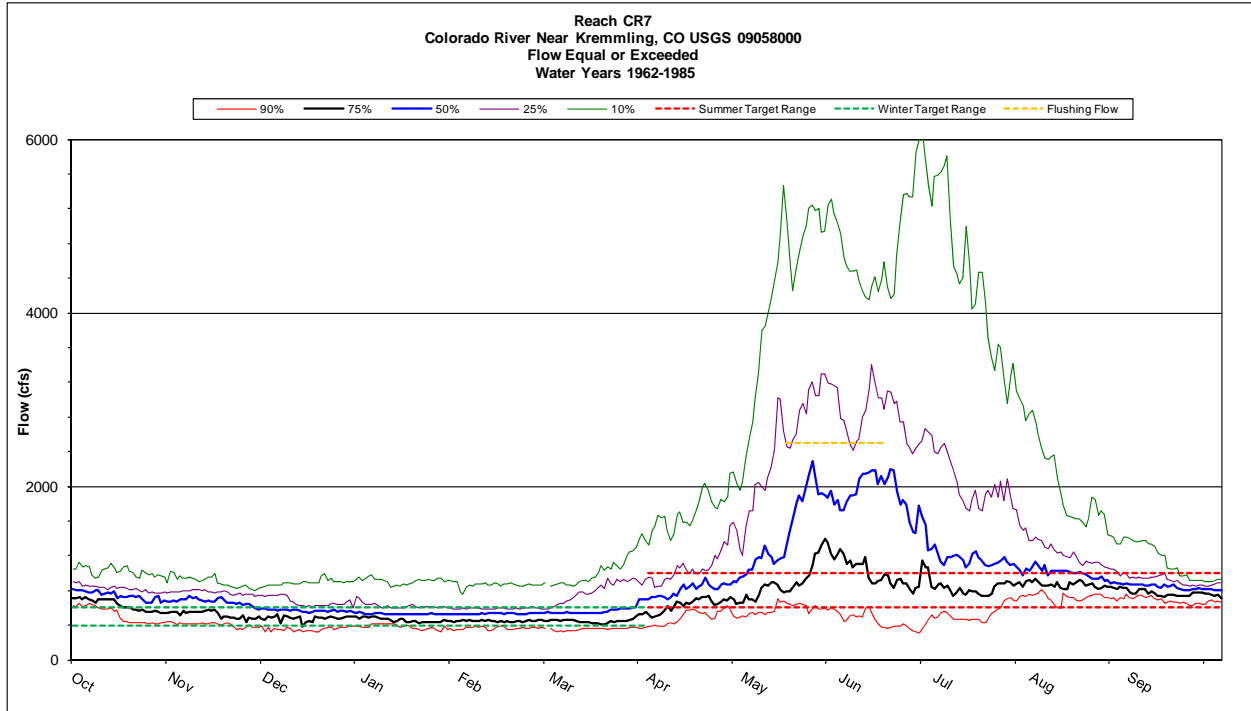


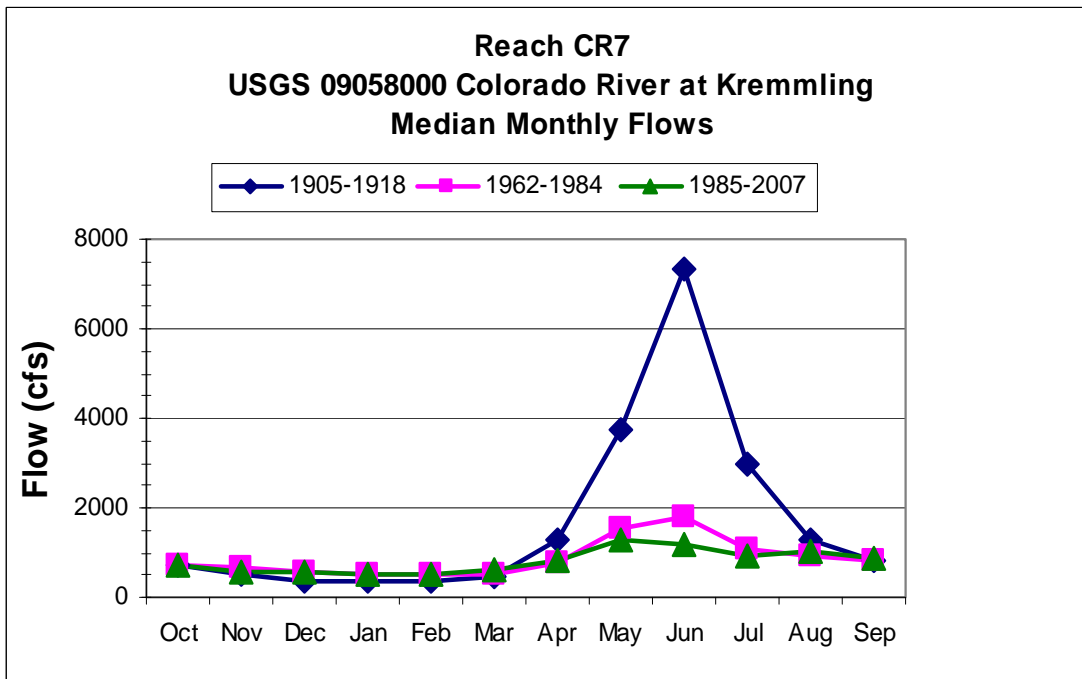
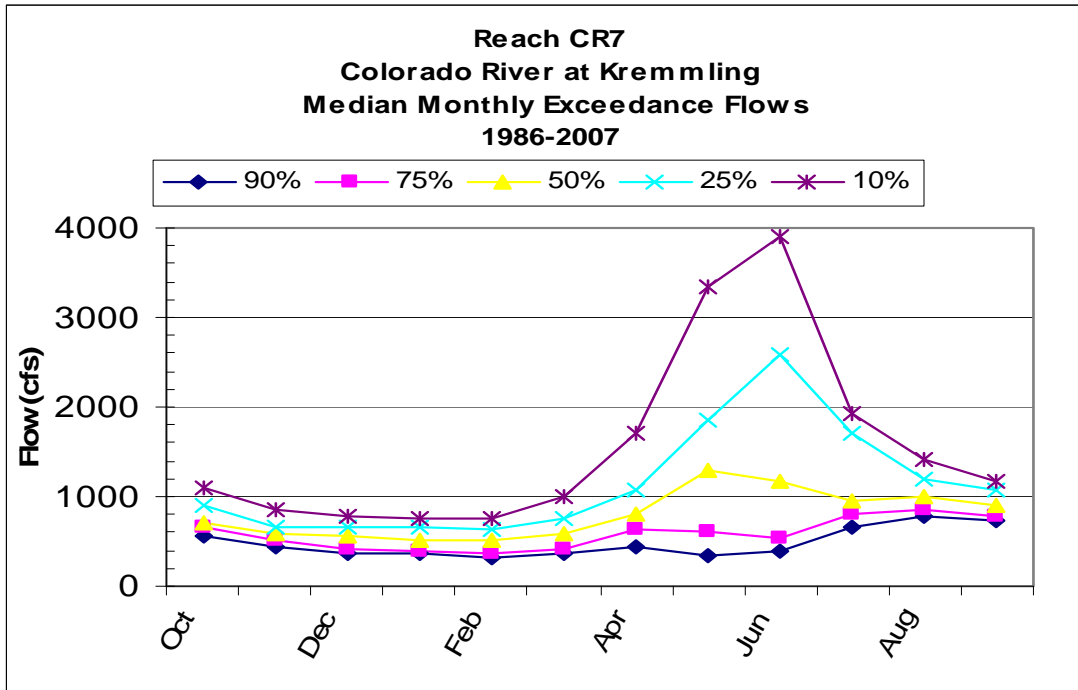
**Transect and Bedload Threshold Plots and Tables**



Reach CR7										
Radium Transect	TT2007 site									
Resistance Method:	Jarrett's Equation									
STAGE	AREA	PERIM	WIDTH	R	DHYD	SLOPE	n	VAVG	Q	SHEAR
(ft)	(sq ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)		(ft/s)	(cfs)	(psf)
2.5	326.00	242.23	241.69	1.35	1.35	0.002	0.035	2.31	753.9	0.17
2.7	374.44	242.90	242.15	1.54	1.55	0.002	0.034	2.59	969.2	0.19
2.9	422.94	243.34	242.32	1.74	1.75	0.002	0.034	2.86	1209.4	0.22
3.1	471.46	243.77	242.49	1.93	1.94	0.002	0.033	3.12	1473.2	0.24
3.3	520.03	244.21	242.66	2.13	2.14	0.002	0.033	3.38	1760.1	0.27
3.5	568.62	244.65	242.82	2.32	2.34	0.002	0.032	3.64	2069.6	0.29
3.7	617.25	245.08	242.99	2.52	2.54	0.002	0.032	3.89	2401.4	0.31
3.9	665.91	245.52	243.16	2.71	2.74	0.002	0.031	4.14	2755.1	0.34
4.1	714.61	245.95	243.33	2.91	2.94	0.002	0.031	4.38	3130.3	0.36
4.3	763.40	248.11	245.26	3.08	3.11	0.002	0.031	4.59	3507.0	0.38
4.5	813.01	253.35	250.35	3.21	3.25	0.002	0.031	4.76	3867.6	0.40
4.7	863.64	258.59	255.44	3.34	3.38	0.002	0.03	4.92	4246.9	0.42
4.9	915.31	264.27	260.98	3.46	3.51	0.002	0.03	5.07	4639.0	0.43
5.0	940.94	267.24	263.88	3.52	3.57	0.002	0.03	5.14	4834.3	0.44

Hydrographs and Exceedence Plots and Tables





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<b>Return Period T (year)</b>	<b>Probability P (percent)</b>	<b>Flood Discharge Q (ft<sup>3</sup>/sec)</b>
1.05	95.2	1126
1.11	90.1	1353
1.25	80	1713
2	50	2813
5	20	4905
10	10	6729
25	4	9606

Flood frequency analysis for USGS 09058000 Colorado River at Kremmling, CO, for 43 years of record (Water years 1962-2006).

## IHA Results

## Reach CR7

## Non-Parametric IHA Scorecard

## USGS 09058000Colorado River at Kremmling 1962-1984 vs 1985-2007

	Pre-impact period: 1962-1984 ( 22 years)		Post-impact period: 1985-2007 ( 23 years)						
	Mean annual flow (cfs)	1034	940.4						
Mean flow/area (dimensionless)	1034		940.4						
Annual C. V.	1		0.86						
Flow predictability (%)	0.66		0.57						
Constancy/predictability	0.79		0.78						
% of floods in 60d period	0.53		0.47						
Flood-free season (days)	33		18						
	MEDIANS		COEFF. of DISP.		DEVIATION FACTOR		SIGNIFICANCE COUNT		
	Pre	Post	Pre	Post	Medians	C.D.	Medians	C.D.	
<b>Parameter Group #1</b>									
October (cfs)	732	718	0.2678	0.3496	0.01913	0.3056	0.7578	0.5135	
November (cfs)	671.3	581.5	0.3603	0.2743	0.1337	0.2388	0.1021	0.4074	
December (cfs)	564.5	550	0.271	0.4636	0.02569	0.7106	0.7247	0.07107	
January (cfs)	520	510	0.2952	0.5451	0.01923	0.8466	0.6557	0.04304	
February (cfs)	528.5	513	0.2625	0.5136	0.02933	0.9565	0.5896	0.01301	
March (cfs)	534.5	594	0.6104	0.5859	0.1113	0.04018	0.3854	0.9079	
April (cfs)	784.8	804	0.4624	0.5566	0.02453	0.2037	0.8488	0.4585	
May (cfs)	1530	1290	1.066	0.9674	0.1569	0.09205	0.5606	0.8879	
June (cfs)	1793	1165	0.9867	1.746	0.3501	0.7699	0.3283	0.06406	
July (cfs)	1095	945	0.8393	0.945	0.137	0.1259	0.2142	0.6456	
August (cfs)	931.5	1010	0.2501	0.3297	0.08427	0.3181	0.08509	0.4134	
September (cfs)	831.3	893.5	0.1307	0.3162	0.07489	1.42	0.07207	0.04104	
<b>Parameter Group #2</b>									
1-day minimum (cfs)	436	391	0.4868	0.3171	0.1032	0.3485	0.4735	0.08609	
3-day minimum (cfs)	452	395.3	0.4746	0.5388	0.1254	0.1353	0.4685	0.5265	
7-day minimum (cfs)	473.1	416.1	0.4352	0.5098	0.1205	0.1713	0.4134	0.4505	
30-day minimum (cfs)	506.5	459.3	0.3711	0.5287	0.09315	0.4246	0.5536	0.07307	
90-day minimum (cfs)	523	515.1	0.3179	0.5312	0.01508	0.6712	0.5075	0.04805	
1-day maximum (cfs)	2920	2690	0.9563	0.9257	0.07877	0.03209	0.7898	0.9049	
3-day maximum (cfs)	2768	2660	0.9714	0.9035	0.03913	0.06989	0.8418	0.8028	
7-day maximum (cfs)	2509	2350	1.005	0.969	0.06321	0.03553	0.6547	0.8869	
30-day maximum (cfs)	2113	1699	0.9679	1.077	0.1959	0.1127	0.4805	0.7467	
90-day maximum (cfs)	1616	1265	1.098	1.161	0.2172	0.05698	0.3604	0.9059	
Number of zero days (count)	0	0	0	0					
Base flow index (7day minimum in cfs/median in cfs)	0.4457	0.4858	0.2569	0.302	0.08999	0.1758	0.4214	0.5786	
<b>Parameter Group #3</b>									
Date of minimum (Julian day)	346.5	132	0.2077	0.3661	0.8279	0.7632	0.03203	0.2172	
Date of maximum (Julian day)	149.5	157	0.06967	0.1011	0.04098	0.451	0.3984	0.4014	
<b>Parameter Group #4</b>									
Low pulse count (#)	3.5	5	1.429	1.2	0.4286	0.16	0.5526	0.8639	
Low pulse duration (days)	8.5	4	1.956	1.375	0.5294	0.297	0.2282	0.5766	
High pulse count (#)	4	4	0.5625	1	0	0.7778	0.6496	0.05205	
High pulse duration (days)	4.5	6.25	0.5	3.98	0.3889	6.96	0.08308	0.07307	
The low pulse threshold is (cfs)	547								
The high pulse threshold is (cfs)	1010								
<b>Parameter Group #5</b>									
Rise rate (cfs difference between consecutive days)	20	20	0.575	0.55	0	0.04348	0.1672	0.9119	
Fall rate (cfs difference between consecutive days)	-20	-19	-0.3	-0.5789	0.05	0.9298	0.2242	0.1081	
Number of reversals	130.5	128	0.1839	0.2031	0.01916	0.1045	0.8358	0.7968	

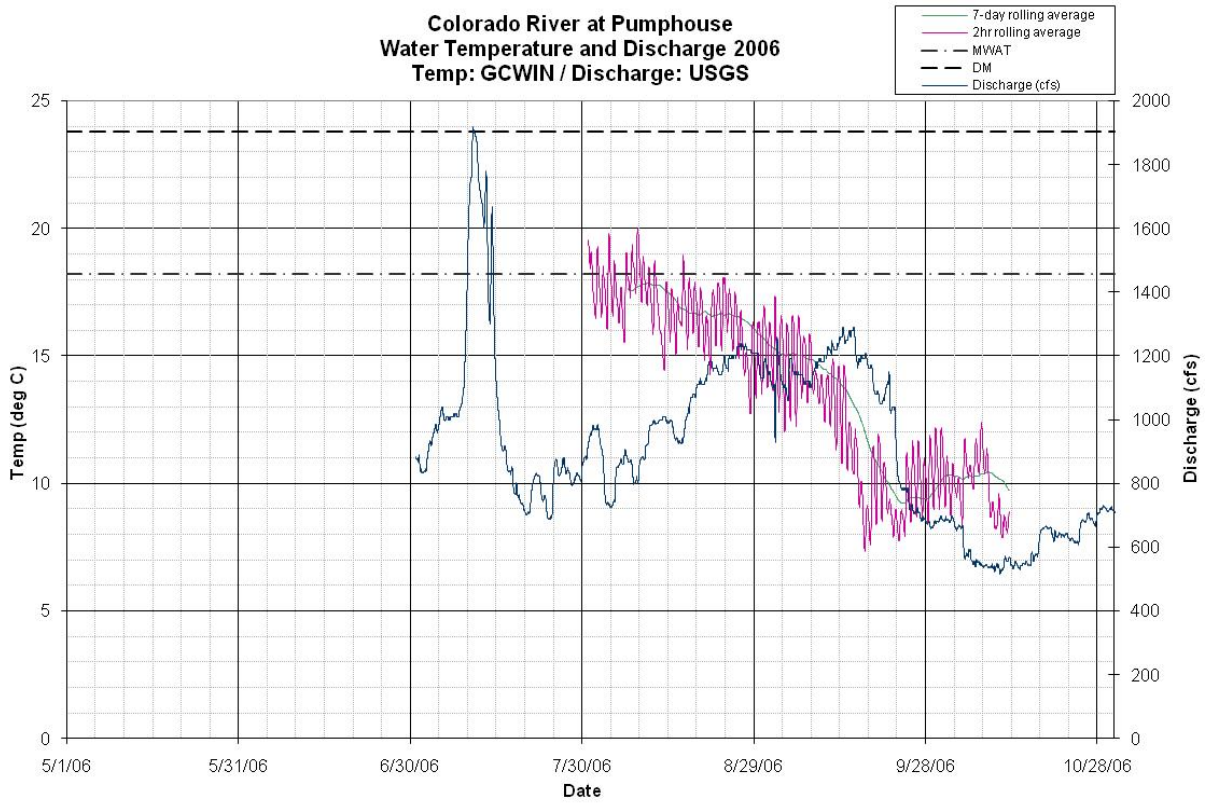
Reach CR7  
IHA Non-Parametric RVA Scorecard  
USGS 09058000Colorado River at Kremmling 1962-1984 vs 1985-2007

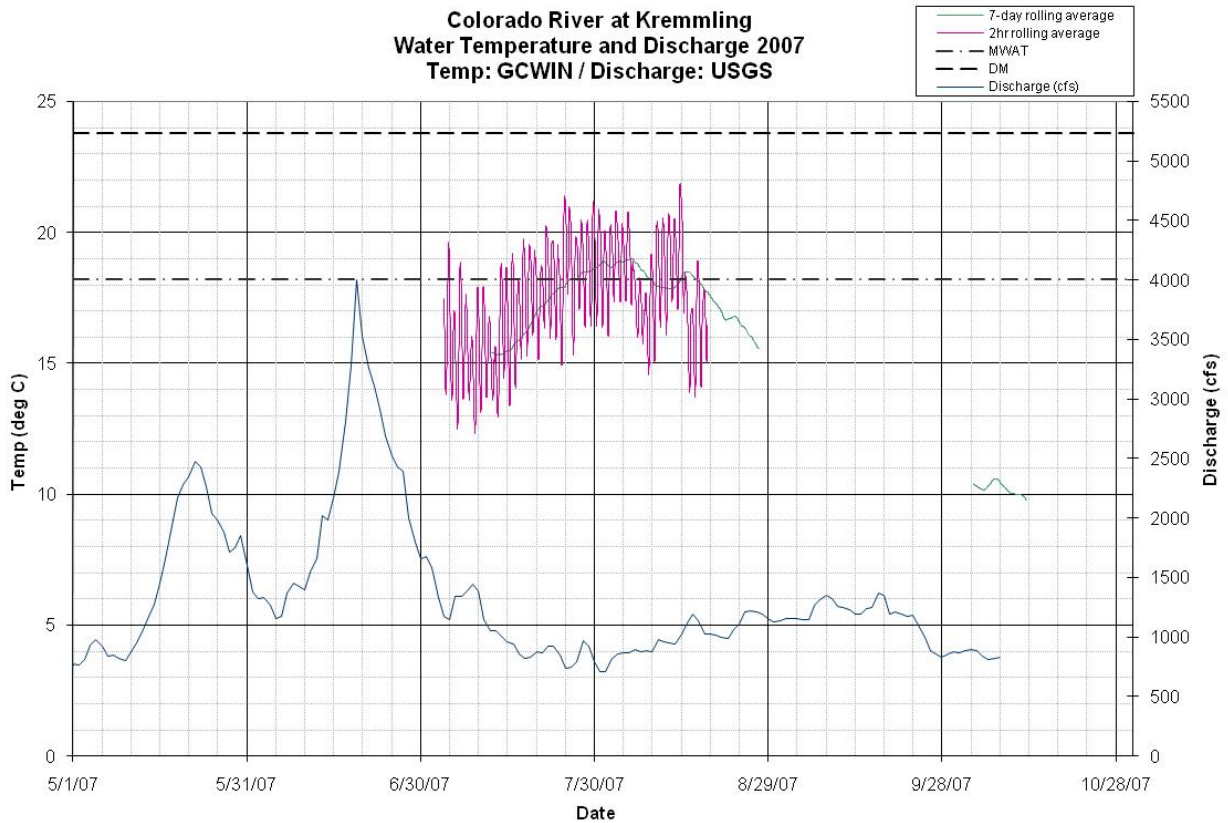
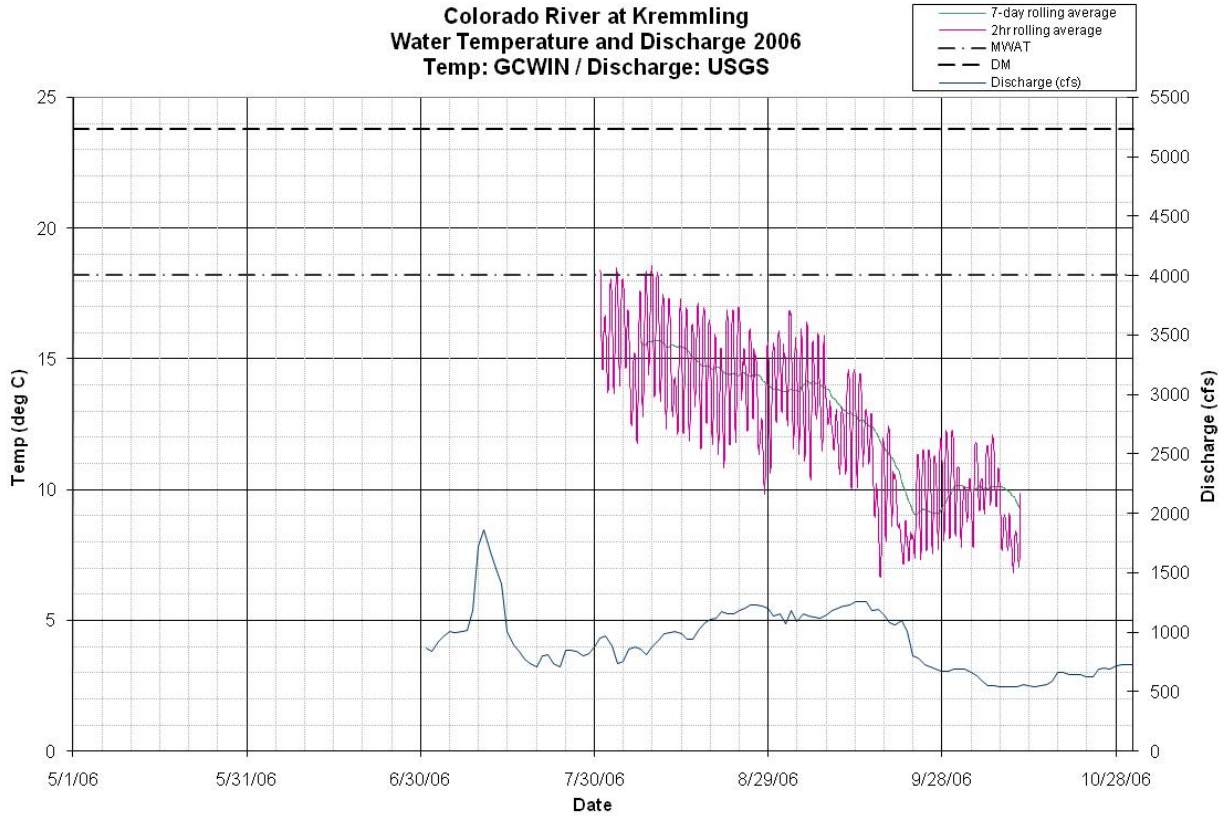
Hydrologic Parameters	Pre-impact period: 1962-1984				Post-impact period: 1985-2007				RVA Boundaries		Hydrologic Alteration (Middle Category)
	Medians	Coeff. of Dispersion	Minimum	Maximum	Medians	Coeff. of Dispersion	Minimum	Maximum	Low	High	
<b>Parameter Group #1</b>											
October (cfs)	732	0.2678	458	1470	718	0.3496	462	1330	674	767.7	-0.2826
November (cfs)	671.3	0.3603	359.5	1185	581.5	0.2743	378	1015	581.6	754.1	-0.2826
December (cfs)	564.5	0.271	270	880	550	0.4636	328	1050	515.9	592.1	-0.4022
January (cfs)	520	0.2952	280	940	510	0.5451	355	1000	474.8	560.8	-0.5217
February (cfs)	528.5	0.2625	290	1035	513	0.5136	311	863	479.3	572.9	-0.5217
March (cfs)	534.5	0.6104	320	1300	594	0.5859	336	1170	482.6	641.9	-0.6413
April (cfs)	784.8	0.4624	459	3590	804	0.5566	281	2785	672.4	948.8	-0.163
May (cfs)	1530	1.066	442	6800	1290	0.9674	271	3630	1016	1924	-0.04348
June (cfs)	1793	0.9867	370.5	7185	1165	1.746	316.5	7135	1207	2285	-0.5217
July (cfs)	1095	0.8393	428	5640	945	0.945	523	4670	914.8	1502	-0.4022
August (cfs)	931.5	0.2501	590	2270	1010	0.3297	776	1840	889.5	1056	0.07609
September (cfs)	831.3	0.1307	700	1265	893.5	0.3162	480	1320	810	852.2	-0.7609
<b>Parameter Group #2</b>											
1-day minimum (cfs)	436	0.4868	250	589	391	0.3171	200	544	307.3	487.6	0.5543
3-day minimum (cfs)	452	0.4746	256.7	592	395.3	0.5388	205	566	329.9	508.1	0.1957
7-day minimum (cfs)	473.1	0.4352	264.3	703.6	416.1	0.5098	225.1	679.7	348.5	515.6	0.07609
30-day minimum (cfs)	506.5	0.3711	270.8	737.4	459.3	0.5287	265.6	801.8	378.7	545.3	-0.2826
90-day minimum (cfs)	523	0.3179	282.5	823.6	515.1	0.5312	293	916.4	462.7	564.3	-0.4022
1-day maximum (cfs)	2920	0.9563	1090	12700	2690	0.9257	980	8270	1893	4070	0.0628
3-day maximum (cfs)	2768	0.9714	1040	11900	2660	0.9035	951.7	8173	1852	3904	0.1957
7-day maximum (cfs)	2509	1.005	1034	10890	2350	0.969	885.6	8023	1764	3631	0.07609
30-day maximum (cfs)	2113	0.9679	985.8	8403	1699	1.077	820	6945	1410	3014	0.07609
90-day maximum (cfs)	1616	1.098	803.4	6257	1265	1.161	719	4234	1126	2280	0.07609
Number of zero days (count)	0	0	0	0	0	0	0	0	0	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.4457	0.2569	0.2372	0.6145	0.4858	0.302	0.2435	0.6822	0.4205	0.4881	-0.6413
<b>Parameter Group #3</b>											
Date of minimum (Julian day)	346.5	0.2077	3	360	132	0.3661	5	349	65.26	338.1	0.913
Date of maximum (Julian day)	149.5	0.06967	91	293	157	0.1011	116	279	145.6	162	-0.3623
<b>Parameter Group #4</b>											
Low pulse count (#)	3.5	1.429	0	15	5	1.2	1	15	1.59	6	-0.1304
Low pulse duration (days)	8.5	1.956	1	165	4	1.375	1	71	3.465	11.21	0.1957
High pulse count (#)	4	0.5625	1	8	4	1	0	15	3	5	-0.3168
High pulse duration (days)	4.5	0.5	1	180	6.25	3.98	1	53.5	4	6	-0.5585
The low pulse threshold is (cfs)			547						4	6	
The high pulse threshold is (cfs)			1010								
<b>Parameter Group #5</b>											
Rise rate (cfs/day)	20	0.575	13	55.5	20	0.55	14	40	18.8	20	-0.4686
Fall rate (cfs/day)	-20	-0.3	-49	-11	-19	-0.5789	-31	-14.5	-21	-19.39	-0.713
Number of reversals (count)	130.5	0.1839	93	152	128	0.2031	98	160	122.6	135.8	-0.2826
<b>Assessment of Hydrologic Alteration</b>											
	Middle RVA Category			High RVA Category			Low RVA Category				
	Expected	Observed	Alter.	Expected	Observed	Alter.	Expected	Observed	Alter.		
<b>Parameter Group #1</b>											
October (cfs)	8.364	6	-0.2826	7.318	10	0.3665	7.318	7	-0.04348		
November (cfs)	8.364	6	-0.2826	7.318	5	-0.3168	7.318	12	0.6398		
December (cfs)	8.364	5	-0.4022	7.318	8	0.09317	7.318	10	0.3665		
January (cfs)	8.364	4	-0.5217	7.318	8	0.09317	7.318	11	0.5031		
February (cfs)	8.364	4	-0.5217	7.318	8	0.09317	7.318	11	0.5031		
March (cfs)	8.364	3	-0.6413	7.318	9	0.2298	7.318	11	0.5031		
April (cfs)	8.364	7	-0.163	7.318	9	0.2298	7.318	7	-0.04348		
May (cfs)	8.364	8	-0.04348	7.318	5	-0.3168	7.318	10	0.3665		
June (cfs)	8.364	4	-0.5217	7.318	7	-0.04348	7.318	12	0.6398		
July (cfs)	8.364	5	-0.4022	7.318	7	-0.04348	7.318	11	0.5031		
August (cfs)	8.364	9	0.07609	7.318	8	0.09317	7.318	6	-0.1801		
September (cfs)	8.364	2	-0.7609	7.318	13	0.7764	7.318	8	0.09317		
<b>Parameter Group #2</b>											
1-day minimum (cfs)	8.364	13	0.5543	7.318	5	-0.3168	7.318	5	-0.3168		
3-day minimum (cfs)	8.364	10	0.1957	7.318	6	-0.1801	7.318	7	-0.04348		
7-day minimum (cfs)	8.364	9	0.07609	7.318	6	-0.1801	7.318	8	0.09317		
30-day minimum (cfs)	8.364	6	-0.2826	7.318	8	0.09317	7.318	9	0.2298		
90-day minimum (cfs)	8.364	5	-0.4022	7.318	8	0.09317	7.318	10	0.3665		
1-day maximum (cfs)	9.409	10	0.0628	6.273	5	-0.2029	7.318	8	0.09317		
3-day maximum (cfs)	8.364	10	0.1957	7.318	5	-0.3168	7.318	8	0.09317		
7-day maximum (cfs)	8.364	9	0.07609	7.318	6	-0.1801	7.318	8	0.09317		
30-day maximum (cfs)	8.364	9	0.07609	7.318	5	-0.3168	7.318	9	0.2298		
90-day maximum (cfs)	8.364	9	0.07609	7.318	6	-0.1801	7.318	8	0.09317		
Number of zero days (count)	23	23	0	0	0		0	0			
Base flow index (7day minimum in cfs/median in cfs)	8.364	3	-0.6413	7.318	11	0.5031	7.318	9	0.2298		
<b>Parameter Group #3</b>											
Date of minimum (Julian day)	8.364	16	0.913	7.318	1	-0.8634	7.318	6	-0.1801		
Date of maximum (Julian day)	9.409	6	-0.3623	6.273	10	0.5942	7.318	7	-0.04348		
<b>Parameter Group #4</b>											
Low pulse count (#)	11.5	10	-0.1304	4.182	9	1.152	7.318	4	-0.4534		
Low pulse duration (days)	8.364	10	0.1957	6.273	3	-0.5217	6.273	10	0.5942		
High pulse count (#)	14.64	10	-0.3168	5.227	10	0.913	3.136	3	-0.04348		
High pulse duration (days)	13.59	6	-0.5585	4.182	11	1.63	5.227	5	-0.04348		
<b>Parameter Group #5</b>											
Rise rate (cfs/day)	9.409	5	-0.4686	6.273	10	0.5942	7.318	8	0.09317		
Fall rate (cfs/day)	10.45	3	-0.713	7.318	12	0.6398	5.227	8	0.5304		
Number of reversals (count)	8.364	6	-0.2826	7.318	8	0.09317	7.318	9	0.2298		

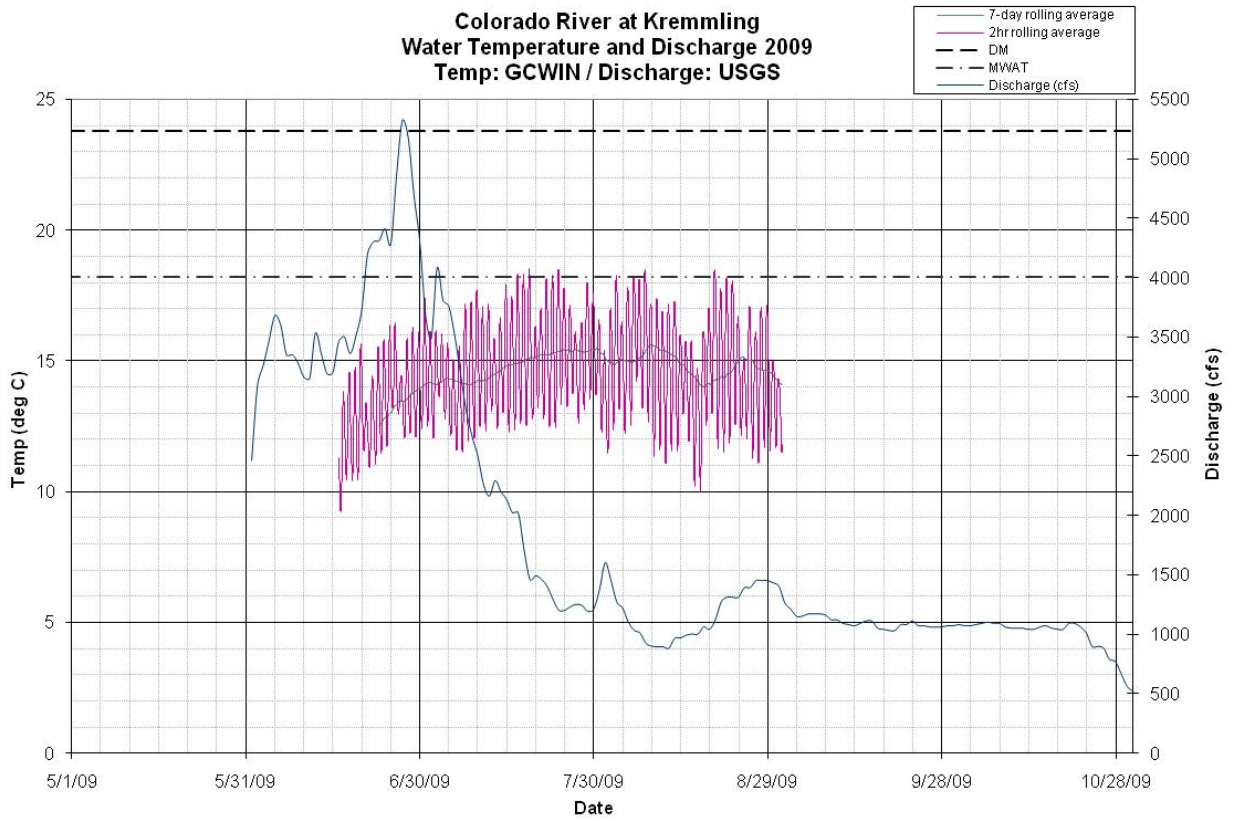
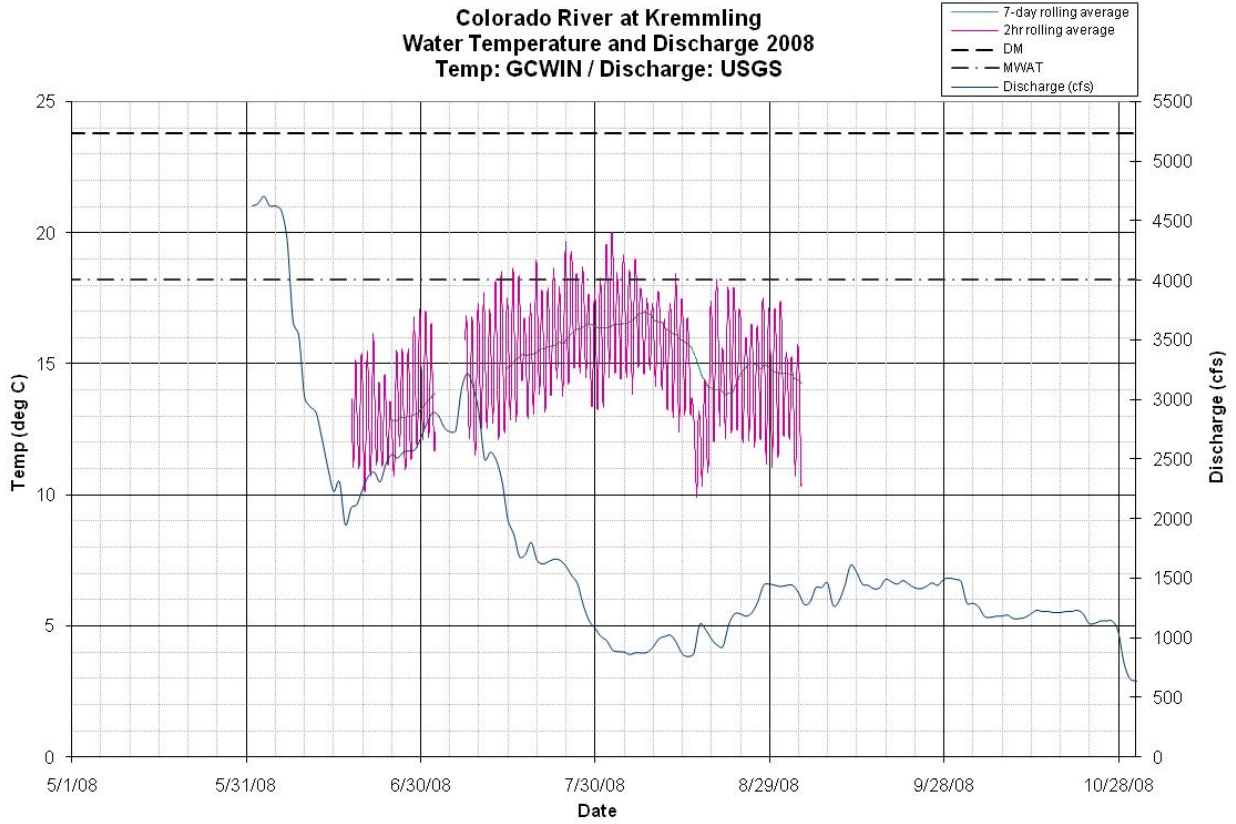
**Reach CR7**  
**IHA Percentile Data**  
**USGS 09058000Colorado River at Kremmling 1962-1984 vs 1985-2007**

Parameter Group #1	Pre-impact period: 1962-1984 ( 22 years)					Post-impact period: 1985-2007 ( 23 years)					
	10%	25%	Pre-Impact 50%	75%	90%	(75-25)/50	10%	25%	Post-Impact 50%	75%	90%
October (cfs)	485.5	602.8	732	798.8	962.4	0.2678	550	660	718	911	1102
November (cfs)	405.2	525.1	671.3	767	841.1	0.3603	436.8	511	581.5	670.5	864.2
December (cfs)	374.5	476	564.5	629	859	0.271	359	411	550	666	780
January (cfs)	392.6	434.5	520	588	865	0.2952	368	382	510	660	761.6
February (cfs)	366	443.9	528.5	582.6	830.7	0.2625	326	378	513	641.5	761.1
March (cfs)	356.6	442	534.5	768.3	948.3	0.6104	362	418	594	766	1000
April (cfs)	534.7	611.1	784.8	974	1618	0.4624	434	622.5	804	1070	1715
May (cfs)	456	927.3	1530	2558	4255	1.066	340.8	612	1290	1860	3334
June (cfs)	461.7	978.9	1793	2748	4531	0.9867	388.3	540.5	1165	2575	3910
July (cfs)	541.2	826	1095	1745	4177	0.8393	668.6	807	945	1700	1918
August (cfs)	775.1	872	931.5	1105	1708	0.2501	786.8	857	1010	1190	1426
September (cfs)	736.2	757.9	831.3	866.5	987	0.1307	738.2	792.5	893.5	1075	1164
<b>Parameter Group #2</b>											
1-day minimum (cfs)	266.2	294.8	436	507	549.1	0.4868	230.8	310	391	434	528.4
3-day minimum (cfs)	271.7	316	452	530.5	572	0.4746	244.1	310	395.3	523	533.1
7-day minimum (cfs)	283	335.2	473.1	541.1	588.4	0.4352	248.9	322.9	416.1	535	587.8
30-day minimum (cfs)	329.1	375.5	506.5	563.5	605.3	0.3711	291.8	335.9	459.3	578.8	702.2
90-day minimum (cfs)	366.1	414.6	523	580.8	706.2	0.3179	346.2	374.7	515.1	648.4	729.1
1-day maximum (cfs)	1180	1680	2920	4473	8786	0.9563	1204	1510	2690	4000	7590
3-day maximum (cfs)	1142	1607	2768	4296	8436	0.9714	1181	1457	2660	3860	7253
7-day maximum (cfs)	1094	1558	2509	4079	7620	1.005	1147	1424	2350	3701	6687
30-day maximum (cfs)	1013	1298	2113	3343	6360	0.9679	1029	1171	1699	3001	4708
90-day maximum (cfs)	836.6	1021	1616	2797	4414	1.098	808.8	941.3	1265	2410	3516
Number of zero days (count)	0	0	0	0	0	0	0	0	0	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.3046	0.4157	0.4457	0.5302	0.5946	0.2569	0.291	0.3901	0.4858	0.5369	0.6411
<b>Parameter Group #3</b>											
Date of minimum (Julian day)	185.3	314.5	346.5	24.5	55.5	0.2077	16.8	63	132	295	330
Date of maximum (Julian day)	132.6	144	149.5	169.5	201.7	0.06967	126	143	157	180	264.2
<b>Parameter Group #4</b>											
Low pulse count (#)	0.3	1	3.5	6	8.7	1.429	1	2	5	8	11.2
Low pulse duration (days)	2	2.625	8.5	19.25	153.9	1.956	1.5	4	4	8	29.4
High pulse count (#)	1.3	3	4	5.25	7	0.5625	2	3	4	7	8
High pulse duration (days)	1.65	3.75	4.5	6	112.3	0.5	1.6	3.75	6.25	28.63	47.05
<b>Parameter Group #5</b>											
Rise rate (cfs difference between consecutive days)	14.3	17.75	20	29.25	35.05	0.575	15	18	20	29	31.8
Fall rate (cfs difference between consecutive days)	-36.5	-22.5	-20	-16.5	-14.3	-0.3	-29.6	-26	-19	-15	-15
Number of reversals	109.2	119.3	130.5	143.3	148	0.1839	109.8	121	128	147	155.4
<b>EFC Monthly Low Flows</b>											
October Low Flow (cfs)	546.8	636	733	794.5	866.2	0.2162	549	632.3	685	809	931.5
November Low Flow (cfs)	419.8	505.3	636	740.3	818	0.3695	454.2	516	581.5	646	825.3
December Low Flow (cfs)	420.6	512.5	573.5	642.5	866.6	0.2267	415.9	430.8	550	656	757
January Low Flow (cfs)	422	469.3	520	592	870	0.2361	410.2	431.3	515	653.8	717.2
February Low Flow (cfs)	413.2	468.8	537	584.8	843	0.216	405	435	531	660	792.5
March Low Flow (cfs)	456	499	539	716	801	0.4026	423.2	456.5	594	724	842.4
April Low Flow (cfs)	589.2	639.4	706	774	848	0.1907	490.7	581.6	705.5	734.8	823.4
May Low Flow (cfs)	539.6	660.5	786	909	961	0.3162	479.2	548.8	669	867.3	989.2
June Low Flow (cfs)	453	543	557	861.5	910	0.5718	428.5	481.4	584	821.5	954
July Low Flow (cfs)	516	565.8	822	912.6	954.5	0.422	626.2	757	839	890.3	929.8
August Low Flow (cfs)	600	780	882.5	894	959	0.1292	766.5	794.5	896.8	970.4	987.4
September Low Flow (cfs)	735.1	757.8	822.5	852.3	934.3	0.1149	530.5	723	756	814	867
<b>EFC Parameters</b>											
Extreme low peak (cfs)	300	316	356.5	378	385	0.1739	310.4	346	360.5	389.8	393.4
Extreme low duration (days)	1	2.5	4	8.5	34	1.5	1	2	4	8	41.8
Extreme low timing (Julian date)	99.5	105.5	296	344.5	355	0.347	303.4	337.8	37	61.5	72.6
Extreme low freq. (#/year)	0	0	0	4.25	8.7	0	0	0	1	4	15.4
High flow peak (cfs)	873.7	1064	1110	1214	1423	0.1351	1036	1110	1200	1400	1764
High flow duration (days)	4.15	6.75	13.75	18.75	31.95	0.8727	3.6	7.75	12.5	30.5	40.7
High flow timing (Julian date)	90.45	123.5	174.8	227.1	308.5	0.2831	107.4	159.3	192	236	257
High flow frequency (#/year)	1	2	3	4	5	0.6667	0.4	1	3	4	6
High flow rise rate (cfs difference between consecutive days)	16.74	32.99	72.06	118.8	173.6	1.19	13.49	30.71	81.5	112.7	163.8
High flow fall rate (cfs difference between consecutive days)	-132.5	-73.29	-57.85	-35.3	-24.96	-0.6566	-184.4	-95.5	-58.67	-44.41	-33.07
Small Flood peak (cfs)	2980	3270	4070	5535	6210	0.5565	3064	3160	4000	7020	8210
Small Flood duration (days)	61	76.5	100	120	184	0.435	52.4	67	105	145	147.6
Small Flood timing (Julian date)	132	139	146	159	177	0.05464	133.8	151	157	171	191.8
Small Flood freq. (#/year)	0	0	0	1	1	0	0	0	0	1	1
Small Flood riserate (cfs difference between consecutive days)	48.17	64.96	84.75	135.6	192.1	0.8336	32.75	55.92	80.26	102.3	204.5
Small Flood fallrate (cfs difference between consecutive days)	-75.15	-56.93	-55.55	-47.14	-41.94	-0.1762	-164	-128.1	-74.48	-46.07	-26.29
Large flood peak (cfs)	9890	9890	11300	12700	12700	0.2488					
Large flood duration (days)	142	142	161.5	181	181	0.2415					
Large flood timing (Julian date)	147	147	170.5	194	194	0.1284					
Large flood freq. (#/year)	0	0	0	0	0.7	0	0	0	0	0	0
Large flood riserate (cfs difference between consecutive days)	112.4	112.4	147.6	182.8	182.8	0.477					
Large flood fallrate (cfs difference between consecutive days)	-139.5	-139.5	-119.8	-100.1	-100.1	-0.329					

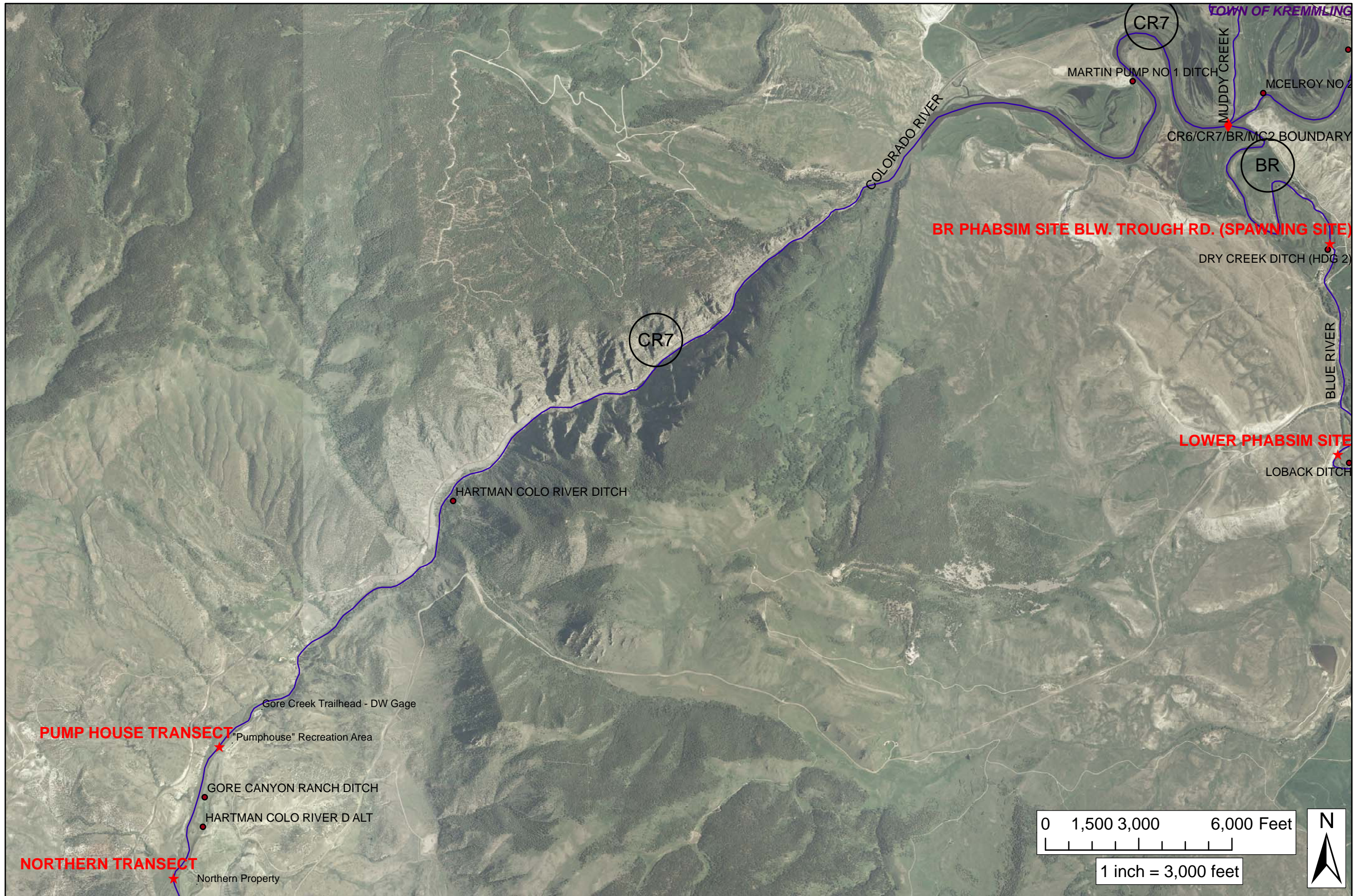
### Surface Water Temperature Plots









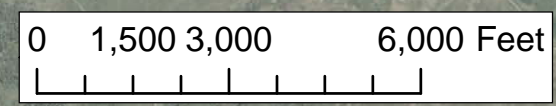


GRAND COUNTY  
STREAM MANAGEMENT PLAN  
REACHES

Legend

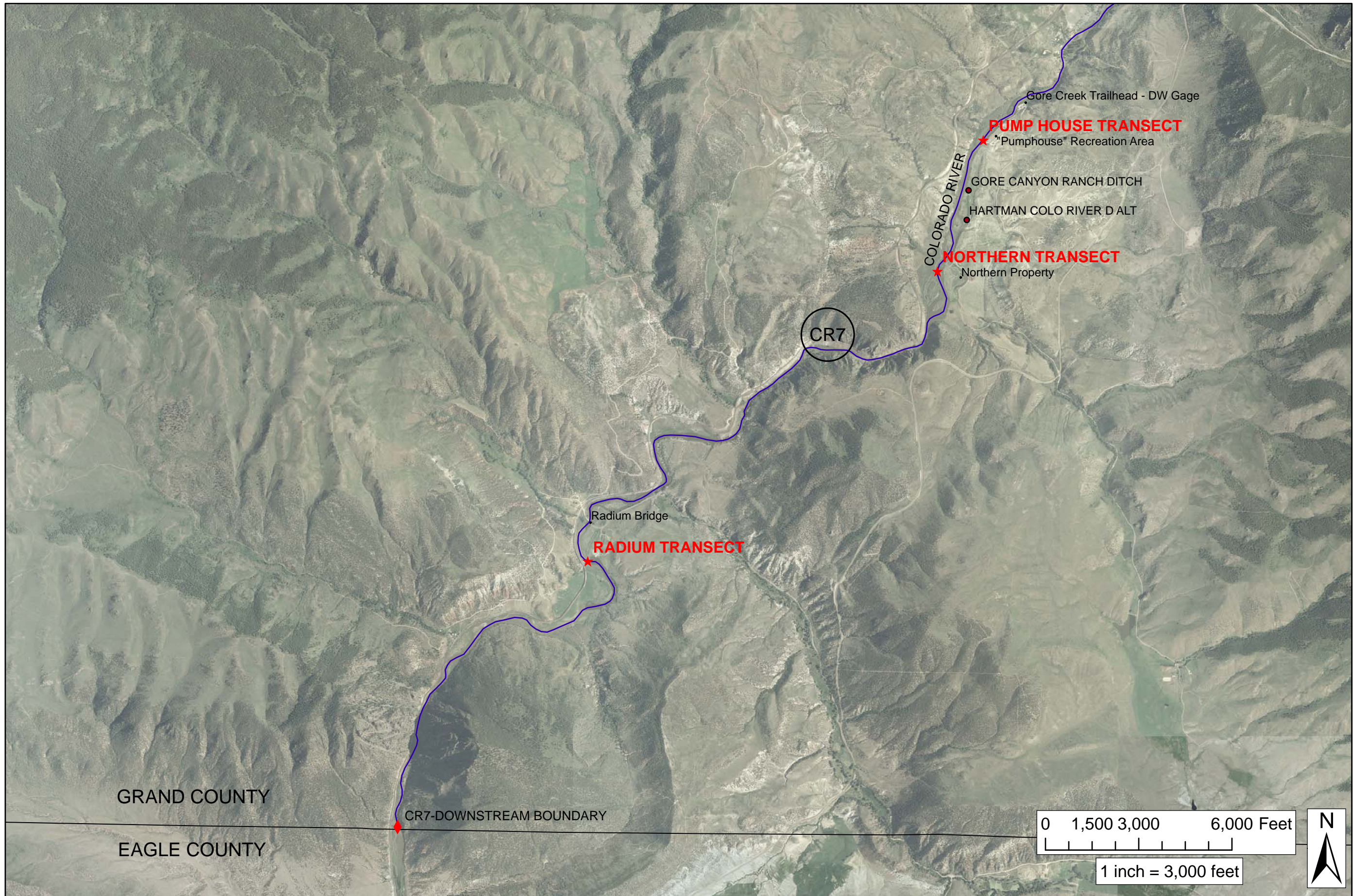
- ◆ REACH BOUNDARY
- ★ PHABSIM SITES
- DIVERSIONS

REACH: CR7  
SHEET # :  
1 OF 2



1 inch = 3,000 feet





GRAND COUNTY

EAGLE COUNTY

CR7-DOWNSTREAM BOUNDARY

Radium Bridge

**RADIUM TRANSECT**

CR7

COLORADO RIVER

**PUMP HOUSE TRANSECT**

"Pumphouse" Recreation Area

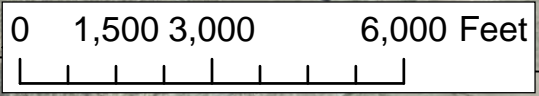
GORE CANYON RANCH DITCH

HARTMAN COLO RIVER D ALT

**NORTHERN TRANSECT**

Northern Property

Gore Creek Trailhead - DW Gage



1 inch = 3,000 feet



GRAND COUNTY  
STREAM MANAGEMENT PLAN  
REACHES

Legend

- ◆ REACH BOUNDARY
- ★ PHABSIM SITES
- DIVERSIONS

REACH: CR7

SHEET # :  
2 OF 2

